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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/712,446	11/13/2003	Terence M. Thomas	02011US	8708

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Rodel Holdings, Inc.
Suite 1300
1105 North Market Street
Wilmington, DE 19899

EXAMINER

GEORGE, PATRICIA ANN

ART UNIT	PAPER NUMBER
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1765

DATE MAILED: 09/29/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/712,446

Applicant(s)

THOMAS ET AL.

Examiner

Patricia A. George

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 November 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☒ Claim(s) 9 and 10 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☒ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 22 March 04
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Election/Restrictions

Claims 9-10 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected of Group II, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on the 20th of July 2005.

Claim Objections

There appears to be a typo in claim 4, as the word "comprising" is consecutively duplicated.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 2-5, use the word "comprising", where a Markush group is clearly intended. Please change the language used to *--consisting of--*.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-3, 5, 6, and 8 are rejected under 35 U.S.C. 102(e) as anticipated by Schroeder et al. of USPN 6,821,897 or, as evidenced by Lai, Jiun-Yu (Chapter 2: Characterization and Optimization of the CMP Process; Mechanics, mechanisms, and modeling of the chemical mechanical polishing process; by Lai, Jiun-Yu.; Thesis (Ph.D.)--Massachusetts Institute of Technology, Dept. of Mechanical Engineering, 2001; Barker Library – Microforms, and Stacks).

Schroeder et al. teaches a method for copper CMP using a composition which has polymeric complexing agents. Schroeder teaches an aqueous composition (col.11, l.20-21) used for polishing copper (col.13, l.6) on any suitable copper-containing substrate (col.13, l.12) such as, a semiconductor wafer (col.13, l.13). Schroeder teaches the composition is comprised by wt.% of: 0.1-15 oxidizer (col.12, l.32); 0.0001-3% inhibitor (col.12, l.48) including azole compounds (col.12, l.45) such as: BTA (col.12, l.47), tolytriazole (TT) (col.12, l.47), which are written on "for nonferrous metal"; at least 50 of the surface of the copper/metal layer of the substrate as a complexing agent (col.13, l.23 and 32-33) which is written on "for nonferrous metal" (see other complexing agents from col.8, l.13 to col.9, l.10); 0.01-1 carboxylic acid polymer; up to 75% by number of total monomers (col.6, l.43) can be polymers such as those from the phosphate group (col.6, l.31) or hydroxyl groups (col.9, l.10 which is written on which are modified cellulose); salts used for oxidizers have both a cationic (col.12, l.12) and an anionic (col.12, l.26-29) components from 0.1-15; and balances of water (see examples 1, 9, 10, 11, and 12).

Schroeder does not specifically teach salt reducing noise level, from vibration between the wafer and a polishing pad, as in claim 1. But, CMP acoustic pressure, the force applied through the cleaning solution, has many tuners which are inherent to the process, and are well known and taught in the related industries of semiconductor manufacturing, CMP processing, and steady-state velocity. More specifically, there is a well-known equation used for calculating related tuners, the Reynolds Equation, which is commonly used for controlling the inherent effect of CMP acoustic pressure. Please note the enclosure: "Chapter 2: Characterization and Optimization of the CMP Process; Mechanics, mechanisms, and modeling of the chemical mechanical polishing process; by Lai, Jiun-Yu.; Thesis (Ph.D.)--Massachusetts Institute of Technology, Dept. of Mechanical Engineering, 2001; Barker Library – Microforms, and Stacks".

In addition, the presently claimed property of the salt reducing noise level from vibration between the wafer and a polishing pad would obviously have been present in the composition of Schroeder because it is an inherent effect of CMP acoustic pressure. Note: In re Rijckaert, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993) and In re Best, 195 USPQ at 433, footnote 4 (CCPA 1977) as to the providing of this rejection made under 35 USC 102.

As for claim 2, Schroeder et al. teaches a cationic component comprises an ionized element selected from the claimed group comprising Groups IA, IIA, IIIA, IVA and IVB of the periodic table of the elements, such as iron and copper (col.12, l.11) as well as cationic alumina which is used in example 2.

As for claim 3, Schroeder et al. teaches the negatively-charged polymer or copolymer comprises one or more monomers selected from the group consisting of sulfonic acids, sulfonates, sulfates, phosphonic acids, phosphonates, and phosphates. More preferably, one or more monomers are selected from the group consisting of styrenesulfonic acid, vinylsulfonic acid, vinylphosphonic acid, and 2-acrylamido-2-methylpropane sulfonic acid (AMPS)(col.6, l.28-35). All from the group in claim 3.

As for claims 5 and 6, Schroeder et al. fully teaches carboxylic acid-containing monomers, carboxylate-containing monomers, or combinations thereof. Schroeder teaches in detail the polymeric complexing agent, including one that has an overall negative charges monomer that can be dicarboxylic acids or dicarboxylates, for example maleic acid and itaconic acid, the polymeric complexing agent can be polyacrylic acid, polymethacrylic acid, polymaleic acid, a saturated or unsaturated polycarboxylic acid, or salt thereof. Schroeder goes on to teaches the polymeric complexing agents also can be copolymers comprising one or more carboxylic acid- or carboxylate-containing monomers in combination with anionic or nonionic comonomers. Schroeder illustrates the copolymer can be a random copolymer, alternating copolymer, periodic copolymer, or block copolymer (e.g., AB, ABA, ABC). Schroeder details the copolymer also can be a graft copolymer, in which a polymer backbone is graft-functionalized with different polymer side chains, or a comb/brush copolymer with regular polymeric side chains. Schroeder teaches many suitable polymeric complexing agents such as methacrylate-co-dimethyldiallylammonium chloride (col.8, 47-48), ammonium acrylate-co-alkyl acrylate (col.8, 52-53), poly(ammonium methacrylate-co-alkyl acrylate or methacrylate (col.8, 53-54), all salts from the group of ammoniums, as

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in claim 4. In some embodiments, Schroeder continues to teach, the CMP system may comprises a mixture of two or more of such polymeric complexing agents, for example polyacrylic acid and polymethacrylic acid (col.7, l.15-37), as in claim 5. Schroeder also illustrates other polymeric complexing agents selected from a group comprising a variety of polyacrylic acids (col.9, l.11-12), as in claim 6, including those of carboxylic containing monomers (col.9, l.11-12) which make up at least 10 to 20% of the monomers, making up at least 0.10% of the total polishing composition (col.9, l.30-31), having many typical molecular weights (as in claim 5 and 6) including 5,000 or more, 10,000 or more, 25,000 or more and about 500,000 or less (col.9, l.21-23). Schroeder also teaches the negatively charged polymers, which specifies a lower limit of about 0.01% of the total polishing composition (col.7, l.5-6), which it written on the claimed limitation of 1:1 weight ration in claim 6.

As for claim 8, Schroeder et al. teaches the solution has a pH of 2-12, which encompassed the claimed range of 5 (col.11, l.23-24).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schroeder et al. of USPN 6,821,897 in view of Li et al, of USPN 6620215.

As for claim 7, Schroeder et al. teaches use of many polymers from groups of modified cellulose, including functional ones (col.7, 58 & col.9, l.9), lower alkyl groups, such as methyl (col.9, l.8-9), and hydroxyl groups (col.9, l.10).

Schroeder is silent as to the claimed modified cellulose, carboxymethyl cellulose.

Li et al, of USPN 6620215, teaches a CMP slurry composition used to polish copper (col.1, l.33), comprising any of many types of cellulose including carboxymethyl cellulose (CMC) (col.9, l.24).

It would have been obvious to one of ordinary skill in the art at the time of invention was made, to use the additive CMC if need, as in the teachings of Li et al., when using the slurry of Schroeder, because Li teaches CMC is a well-known additive that may be used as needed depending on the type of object or conditions for the polishing operation (col.9, l.16-19). CMC is well known, advertised, and commercially sold as a slurry thickening ingredient, by a number of semiconductor suppliers.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure, such as: 5,861,005; 6,063,306; 6,699,299; 6,293,848; and 6,582,633.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Patricia A. George whose telephone number is (571)272-5955. The examiner can normally be reached on weekdays between 7:00am to 4:30pm.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on (571)272-1465. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


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NADINE G. NOPTON
SUPERVISORY PATENT EXAMINER

